

1996 Kentucky Report to Congress on Water Quality

Kentucky Natural Resources and Environmental
Protection Cabinet

Division of Water



1996

**KENTUCKY
REPORT TO CONGRESS
ON
WATER QUALITY**

**COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND
ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION**

DIVISION OF WATER

OCTOBER 1996

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This report was prepared by the Kentucky Division of Water (DOW) to fulfill requirements of Section 305(b) of the Federal Water Pollution Control Act of 1972 (P.L. 92-500) as subsequently amended and commonly known as the Clean Water Act. Section 305(b) requires that states submit to the U.S. Environmental Protection Agency (EPA) on a biennial basis a report assessing current water quality conditions. This report presents an assessment of Kentucky's water quality for the period October 1993 through September 1995. Topics that are discussed in the report are: 1) monitoring programs and data sources; 2) water quality conditions and use support of streams, rivers and lakes; 3) wetland issues; 4) groundwater issues; 5) water pollution control programs; and 6) recommendations on additional actions necessary to achieve the objectives and goals of the Clean Water Act.

Water Quality Assessment

The water quality assessment of rivers and streams in this report is based on the support of designated uses in state waters depicted on U.S. Geological Survey (USGS) 1:100,000 scale topographic maps, excluding the Mississippi River. The maps contain about 49,100 miles of streams, of which approximately 9,219 miles were assessed by the DOW. The 664 miles of the Ohio River bordering Kentucky were assessed by the Ohio River Valley Water Sanitation Commission (ORSANCO). Total miles are based on Reach File 3

data files provided by EPA on 1:100,000 scale USGS maps.

Forty-four primary ambient water quality monitoring stations, characterizing approximately 1,432 stream miles within the state, were operated by the DOW during the reporting period. Also, water quality data from ten stations operated by federal and other state agencies were used. For groundwater, ambient monitoring at 70 sites statewide was begun in 1995. Biological monitoring occurred at 25 stations during 1994 and 1995. In addition, 13 lakes were sampled for eutrophication trends. Seventeen intensive surveys were conducted on 106 miles of streams to evaluate point source and nonpoint agricultural pollution, baseline water quality, and the status of water quality in streams assessed previously. Forty stations are maintained in the Reference Reach program, a recent effort to characterize the state's least impacted waters. A total of 689 miles have been assessed by this program since 1992, including several sites that did not qualify for Reference Reach status. For the first time, finished drinking water data (required of public water systems by the Safe Drinking Water Act) were used for assessing the drinking water use in 1,651 miles of streams and 57 lakes. Water Watch, a citizen's education program, has 270 water testing teams in place, each equipped with field kits that measure dissolved oxygen, pH, temperature, nitrates, chloride, and iron. Also, 160 biological monitoring teams

have been placed in the field. The Water Watch Program also supports shoreline cleanup projects, community education, and leadership training. Numerous watershed organizations, particularly in urban areas, have emerged in Kentucky and are dedicated to improving river and riparian management. A total of \$100,000, in the form of seed grants of up to \$5,000, was again provided by the Kentucky legislature to help these organizations in their conservation efforts. The DOW has become increasingly involved with these organizations by providing them with technical support and information. Also, the DOW has created an international "Sister Rivers" project to link river groups from different countries with Kentucky-based watershed organizations.

Overall use support was assessed by following EPA guidelines that define fully supporting as fully supporting all uses for which data are available. If a segment supported one use but did not support another, it was listed as not supporting. For instance, if a segment supported a warmwater aquatic habitat use but not a primary contact recreation use, it was listed as not supporting. A segment is listed as partially supporting if any assessed use fell into that category even if another use was fully supported. Many waterbodies were assessed for only one use because data were not available to assess other uses.

Aquatic life, swimming, drinking water, and fish consumption uses were assessed. Excluding the Ohio River, full support of uses occurred in 5,982 miles (65 percent), uses were not supported in

2,056 miles (22 percent), and partial use impairment was found in 1,180 miles (13 percent) of the assessed waters (Table I.) This summary does not include ORSANCO's assessment of the mainstem of the Ohio River. ORSANCO reports that none of the 664 miles of the Ohio River bordering Kentucky fully supported swimming, fish consumption, or drinking water supply uses. For aquatic life use, 110 miles fully supported and 80 miles were not assessed. The Mississippi River, which forms 71 miles of Kentucky's western border, is assessed by Missouri.

Swimming use was impaired to a much greater extent than was aquatic life use (Figure I). The major causes of use nonsupport were fecal coliform bacteria contamination (pathogen indicators), which affected swimming use, and siltation and organic enrichment, which impaired aquatic life use (Figure II). Nonpoint sources impacted about three times as many miles as point sources. The major sources of the fecal coliform contamination were sanitary (both municipal and package wastewater treatment plants), agricultural nonpoint sources, septic tanks, and straight pipes. Sanitary wastewater facilities were also the source of the organic enrichment, while mining and agricultural nonpoint sources were the major sources of siltation (Figure III).

For drinking water use, only 20 of the more than 200 Public Water Supplies dependent on surface waters had violations of maximum contaminant levels (MCL) for the period 1993-95, and follow-up sampling indicated that the

Table I. Summary of Assessed Use Support ^a Miles			
	Assessed Basis		
Degree of Support	Evaluated	Monitored	Total
Fully Supporting	1765.5	4041.4	5806.9
Fully Supporting but Threatened	116.7	58.8	175.5
Partially Supporting	511.6	668.8	1180.4
Miles Not Supporting	859.6	1196.5	2056.1
TOTAL	3253.4	5965.5	9218.9

^a Excludes mainstems of Ohio and Mississippi rivers; refer to ORSANCO and Missouri 305(b) reports

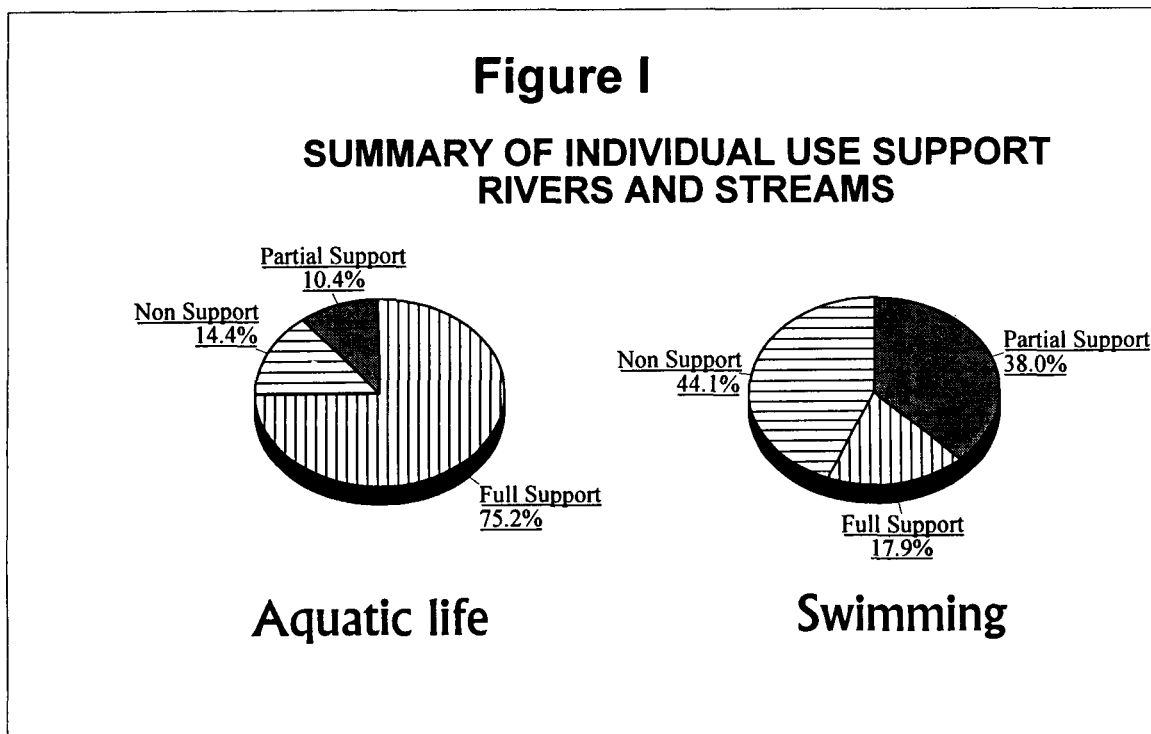


Figure II
CAUSES OF USE NONSUPPORT
RIVERS AND STREAMS

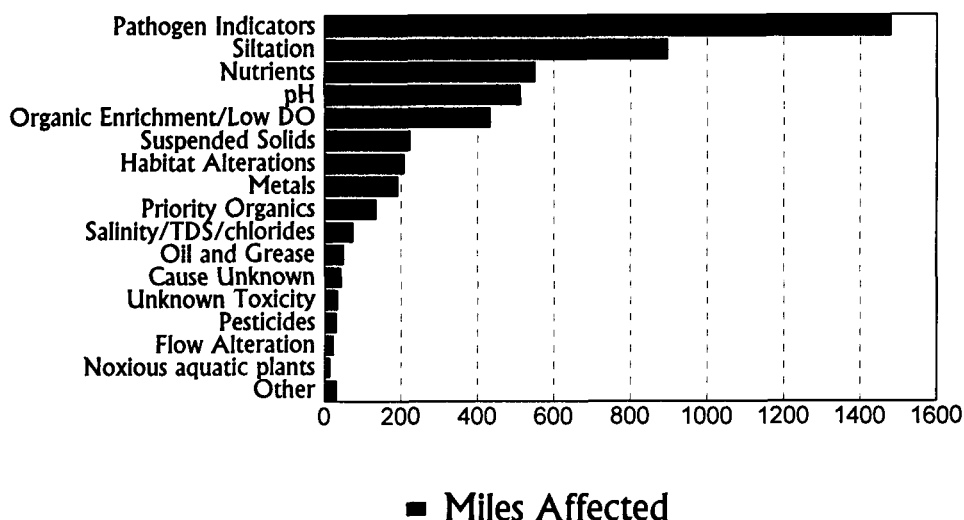
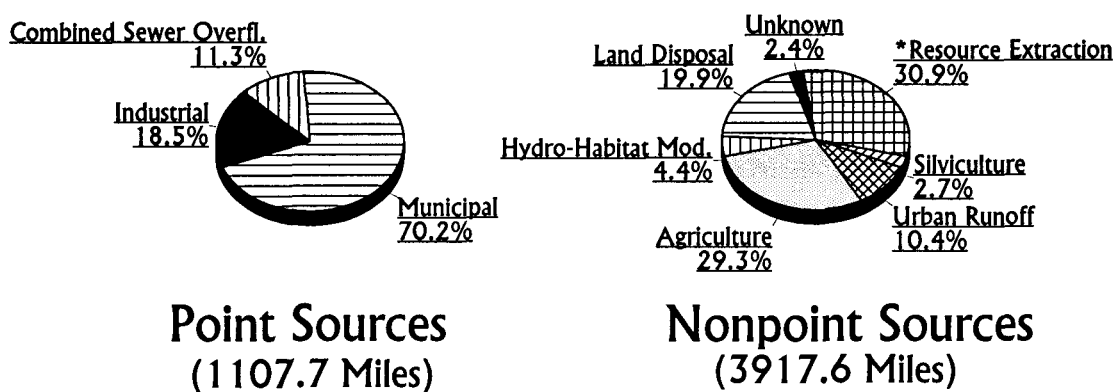


Figure III
SOURCES OF USE NONSUPPORT
RIVERS AND STREAMS



* includes pre-1977 Surface Mining Control and Reclamation Act mining operations

initial violations were not significant. For groundwater sources, MCL violations have averaged about five per year for the last three years.

Inadequate sewer collection systems are a major concern in many towns. Surface waters are impacted by overflows from these systems primarily during and immediately following rainfall events.

Trends were not assessed for the 1996 report because only two years of additional data were available since the previous trend analysis was reported in 1994. The previous trend analysis showed that there had been some notable improvements in water quality. Chloride had decreased significantly at 19 ambient monitoring stations over the past several years. Trend analysis revealed that chloride levels in the Kentucky River had returned to near background levels. The decrease in chlorides was attributed to enforcement of KPDES permit limits on oil and gas production facilities, decreased oil and gas production, and differing stream flows. Nutrients had also exhibited decreasing trends at many stations across the state.

Swimming advisories were in effect in three areas of the state, and citizens have been advised not to swim in streams in and downstream of urban areas following rainfall events. Fecal coliform contamination caused swimming advisories to be re-issued for the Licking River and two tributary streams near Covington, 86 miles of the upper reaches of the North Fork Kentucky River, and several streams in the Upper Cumberland River basin in Bell and Harlan counties.

Bacteriological surveys at Lake Cumberland, Herrington Lake, Taylorsville Lake, and Laurel River Lake indicated that the swimming use was supported in the main lakes and around major marinas and houseboat docking areas. No beaches were closed by the Parks Department during this reporting period.

Fish consumption advisories remain in effect for the Mud River and Town Branch in Logan, Butler, and Muhlenberg counties, the West Fork of Drakes Creek in Simpson and Warren counties, Green River Lake, and Little Bayou Creek in McCracken County because of PCB contamination, and for five ponds on the West Kentucky Wildlife Management Area (McCracken County) because of mercury from unknown sources. The entire length (664 miles) of the Ohio River bordering Kentucky remains posted with fish consumption advisories because of PCB and chlordane contamination. The Ohio River advisories are specifically for the consumption of channel catfish, carp, white bass, paddlefish, and paddlefish eggs. Thirty-two fish kills totaling about 172,000 fish were reported during 1994-1995, affecting 50 miles of streams. The number of fish kills, waterbodies affected, miles affected, and fish killed were the highest since 1989 and disrupted what had been a declining trend since 1986. Fish kills were most commonly attributed to oil and chemical spills.

Wetlands are considered waters of the Commonwealth and are protected from loss and degradation primarily through Water Quality Certifications

issued by the DOW under the authority of Section 401 of the Clean Water Act. In 1994-95, certifications were issued for 387 activities, denied for six activities, and either waived or exempted for another 74 activities. Unavoidable impacts to wetlands require mitigation to compensate for lost wetland acreage and function.

The water quality assessment of lakes included more than 90 percent of the publicly owned lake acreage in Kentucky. Eighty-six of 120 lakes (72 percent) fully supported their uses, 28 (23 percent) partially supported uses, and 6 (5 percent) did not support one or more uses. On an acreage basis, more than 91 percent (199,718 acres) of the 218,362 assessed acres fully supported uses, 8 percent (18,192 acres) partially supported uses, and less than one percent (452 acres) did not support one or more uses (Figure IV).

Nutrients were the most frequent cause of uses in lakes not being fully supported (Figure V). Agricultural runoff and septic tanks were the principal sources of the nutrients (Figure V). PCBs affected one lake of considerable size, resulting in a high percentage of lake acres impacted by priority organics (Figure V). Naturally shallow lake basins, which allow the proliferation of nuisance aquatic weeds that impair secondary contact recreation, accounted for the second greatest cause of use nonsupport. Other natural conditions such as manganese releases from anoxic hypolimnetic water and nutrients in runoff from relatively undisturbed watersheds affected domestic water

supply and secondary contact uses, respectively. Suspended solids from surface mining activities impaired the secondary contact recreation use in fewer eastern Kentucky reservoirs than in the previous two-year reporting period.

An analysis of lake trophic status indicated that of the 104 lakes assessed, 60 (57.7 percent) were eutrophic (including three that were hypereutrophic), 33 (31.7 percent) were mesotrophic, and 11 (10.6 percent) were oligotrophic. One-half of the lake acres assessed (108,151 acres) were eutrophic. Of the rest, 22 percent were mesotrophic and 29 percent were oligotrophic (Figure VI). The Lily Creek and Pitman Creek embayments of Lake Cumberland changed from a eutrophic state to a mesotrophic state, and Carr Fork Lake changed from a eutrophic to an oligotrophic state. These accounted for the major changes in lake trophic status from the 1994 305(b) report.

The envelope on the back inside cover of this report contains color-coded maps illustrating use support by major river basins. The maps include all streams and all but a few of the smaller lakes that were assessed.

Water Pollution Control Programs

Kentucky's water pollution control programs continued to improve existing and develop new approaches for controlling pollution. Permitting of combined sewer overflows (CSOs) and stormwater outfalls was initiated in the summer and fall of 1991 and proceeded throughout this 305(b) reporting period.

Figure IV

SUMMARY OF LAKE USE SUPPORT

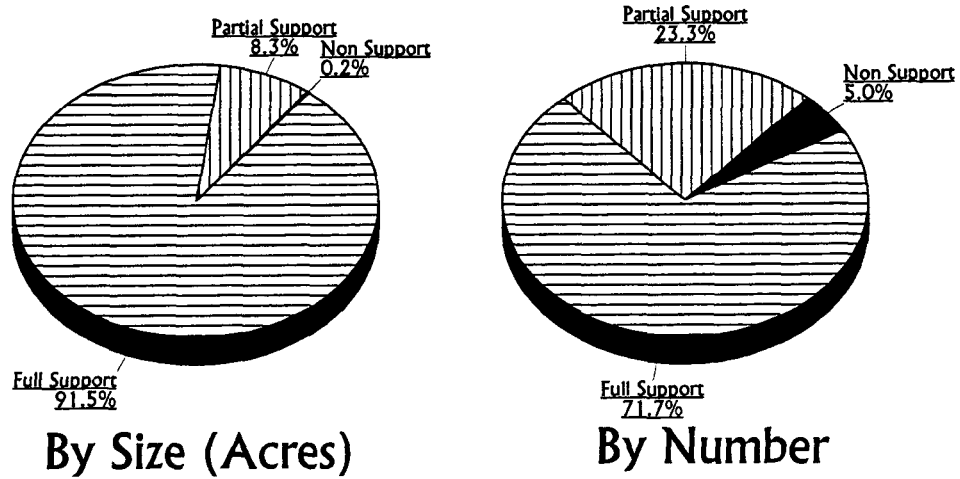


Figure V

USE NONSUPPORT IN LAKES

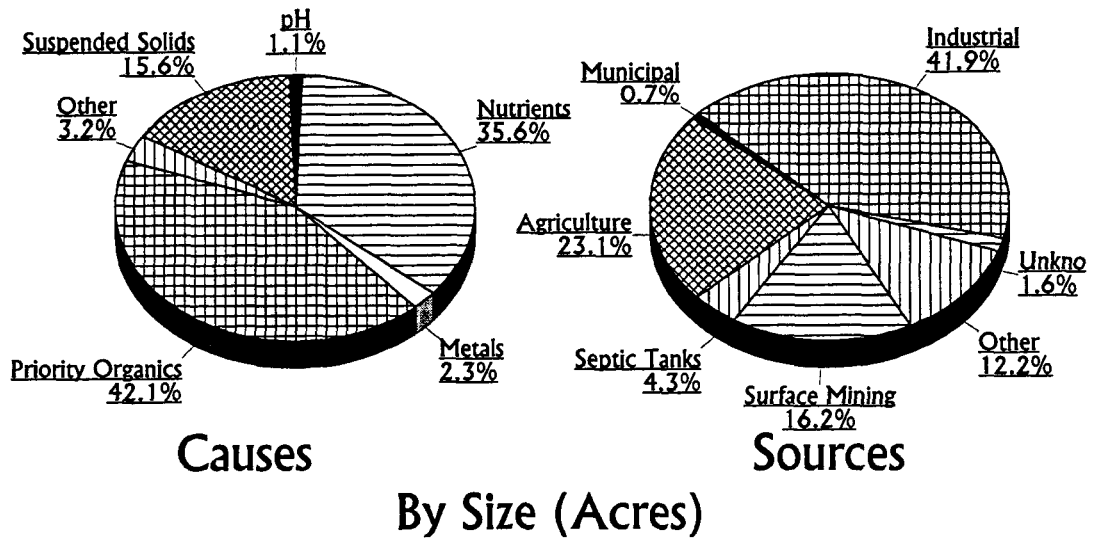
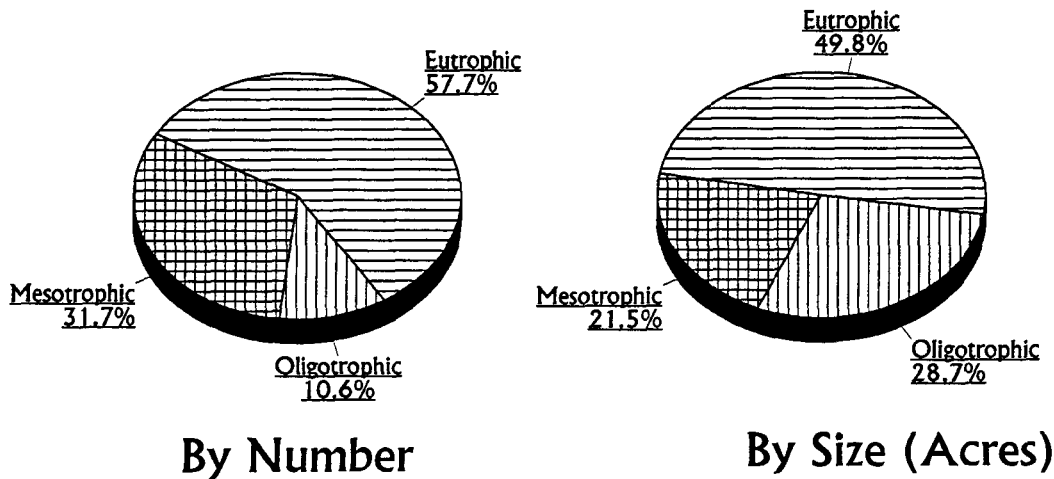


Figure VI
SUMMARY OF LAKE TROPHIC STATE



By the end of 1995, 81 municipal and 43 industrial wastewater treatment facilities had KPDES permit requirements for whole effluent toxicity testing. The DOW conducted acute and chronic toxicity tests on 39 point source discharges in 1994 and 1995. A total of 2,073 tests were conducted by permitted facilities. One hundred and four facilities (84 percent) were in compliance with their toxicity limits, and 20 facilities (16 percent) were conducting toxicity identification/reduction evaluations to reduce the toxicity of their effluents. Twenty-five facilities completed the toxicity reduction/identification process in the two-year period up to the end of 1995.

Pretreatment programs have been approved in 71 cities to better treat industrial wastes flowing into publicly

owned treatment works. Sixty-four of the programs are active. New programs were approved and implemented in three municipalities. Four other municipalities needing pretreatment programs are on schedule for obtaining approval.

A state revolving loan fund program has continued to help meet the needs of wastewater treatment plant construction. Twenty-three municipal wastewater treatment projects were completed in 1994-95. These projects have either replaced outdated or inadequate treatment facilities, addressed inflow/infiltration problems, or have provided a centralized collection and treatment system for the first time. Since 1989, Kentucky has received more than \$177 million in capitalization grants and has added \$35 million in state funds under this program.

The Nonpoint Source (NPS) program is providing oversight and (Clean Water Act) Section 319 grant funds for 55 projects. These projects address watershed remediation, education, training, best management practice evaluation, and technical assistance. Kentucky's NPS program has received a total of more than \$7 million through 319 grants from EPA since 1990.

The NPS program continues to monitor water quality in four watersheds with NPS pollution remediation demonstration projects. The Mammoth Cave, Upper Salt River/Taylorsville Lake, and Fleming Creek projects involve agricultural pollution remediation throughout the entire watershed. Biologists in the NPS program are cooperating with personnel in the Tennessee NPS Program by conducting water quality monitoring in the Bear Creek interstate watershed. Acid mine drainage in this watershed of the Big South Fork Cumberland River is being remediated by Tennessee agencies. These are long-term studies to determine nonpoint source impacts and demonstrate water quality improvements from best management practices.

Education efforts in the NPS program are producing several noteworthy achievements. Two video programs on pollution problems from nonpoint sources in Kentucky were produced under contract with Western Kentucky University. One of the videos focuses on abandoned mine lands and

water quality. Funding was awarded to the American Cave and Conservation Association to assist in developing NPS-related exhibits at its American Museum of Caves and Karstlands located in Horse Cave. The DOW has contracted with the Kentucky Waterways Alliance to award small grants to local citizen waterway groups for nonpoint source education projects.

Kentucky's groundwater program continues to make advances to strengthen protection strategies and to implement regulations. A new groundwater regulation became effective in August 1994. This regulation requires facilities that conduct activities with the potential to pollute groundwater to develop and implement groundwater protection plans. Other programs have become fully established in recent years (Driller Certification Program) or have been initiated and have begun to show beneficial results (Wellhead Protection Program). Programs and regulations of agencies other than the Division of Water (e.g. State Superfund and RCRA programs) are also continuing to protect groundwater. The Groundwater Branch of the Division of Water began an ambient monitoring network of 70 sites in 1995. Groundwater data have also been collected by public water supplies as required by Phase II/Phase V of the Safe Drinking Water Act. In 1995, eight (2 percent) of these groundwater systems experienced violations of maximum contaminant levels, mostly bacteria and nitrates.

BACKGROUND

BACKGROUND

This report was prepared by the Kentucky Division of Water (DOW) to fulfill the requirements of Section 305(b) of the Federal Water Pollution Control Act of 1972 (P.L. 92-500) as amended by the Clean Water Act of 1987 (P.L. 100-4). Section 305(b) requires that every two years states submit to the U.S. Environmental Protection Agency (EPA) a report addressing current water quality conditions. This report generally assesses data collected in 1994 and 1995 using EPA guidelines provided to the states. Items addressed in the report include: 1) monitoring programs and data sources; 2) water quality conditions and use support of streams rivers, and lakes; 3) wetlands issues; 4) groundwater issues; 5) water pollution control programs; and 6) recommendations on actions necessary to achieve the goals and objectives of the Clean Water Act. EPA uses the reports from the states to apprise Congress of the current water quality of the nation's waters and to recommend actions that are necessary to achieve improved water quality. States use the reports to provide information on water quality conditions to the general public and other interested parties and to help set agency pollution control directions and priorities.

Thirteen major river basins lie within Kentucky. These major basins are further divided by the U.S. Geological Survey (USGS) into 42 smaller basins called cataloging units. The major river basins (from east to west) are the Big Sandy, Little Sandy, Tygarts, Licking, Kentucky, Upper Cumberland, Salt, Green, Tradewater, Lower Cumberland,

Tennessee, and Mississippi. The Ohio River minor tributaries were also assessed by the DOW. The Ohio River Valley Water Sanitation Commission (ORSANCO) provided an assessment summary of the Ohio River mainstem. Water quality assessment information on waterbodies is stored in a computer software package called the Waterbody System (WBS). The software was developed by Research Triangle Park under guidance of EPA and several states. Kentucky was one of the states involved in the testing and development of the WBS software.

The assessment of lake conditions is based on data collected by the DOW in 1994 and 1995 through a lake assessment project funded partially under the federal Clean Lakes Program and from other current monitoring data. The 120 lakes that were assessed have a total area of 218,362 acres and make up more than 90 percent of the publicly owned lake acreage in the state. This includes the Kentucky portions of Barkley, Kentucky, and Dale Hollow lakes, which are border lakes with Tennessee. An EPA estimate made in 1993 of the number of lakes in the state is based on lakes shown on the 1:100,000 scale base map and separates lakes into two groups by size. According to those estimates, Kentucky has 2,721 lakes. Of the total, 1,768 are less than 10 acres and 953 are 10 acres or greater in size.

The DOW, in collaboration with the Kentucky Department of Fish and Wildlife Resources (KDFWR),

contracted with the U.S. Fish and Wildlife Service to map wetlands in the Commonwealth. According to these estimates, Kentucky has a total of 836,871 acres of wetlands of all types, including those classified as deep water. Palustrine wetlands comprise the majority (441,480) of wetland acreage.

Kentucky's population at the time of the 1990 census was 3,685,296. The state has an approximate area of 40,598 square miles. It is estimated that there are approximately 89,431 miles of streams within the borders of Kentucky. That figure was determined from the Kentucky Natural Resources Information System, which has a computerized geographic database. All of the blue-line streams on the 7.5 minute (1:24,000) USGS topographic maps were digitized to produce the figure. Main channel and tributary river miles in reservoirs are included. EPA estimates from their Reach File 3 that there are 49,105 miles of streams in the state shown on USGS 1:100,000 scale maps. Of these stream miles, 18,745 are in Kentucky's assessment base, and 9,219 were assessed for this report. Kentucky has 855 miles of border rivers. The northern boundary of Kentucky is formed by the low water mark of the northern shore of the Ohio River, and extends 664 miles along the river from Catlettsburg, Kentucky in the east to the Ohio's confluence with the Mississippi River near Wickliffe in the west. The southern boundary is formed by an extension of the Virginia-North Carolina 1780 Walker Line that extends due west to the Tennessee River. Following the acquisition of the Jackson Purchase in

1818, the 36°30' parallel was accepted as the southern boundary from the Tennessee River to the Mississippi River.

Kentucky's eastern boundary begins at the confluence of the Big Sandy River with the Ohio River at Catlettsburg and follows the main stem of the Big Sandy and Tug Fork southeasterly to Pine Mountain, for a combined length of 121 miles, then follows the ridge of the Pine and Cumberland mountains southwest to the Tennessee line. The western boundary follows the middle of the Mississippi River for a length of 71 miles and includes several of the islands in the Mississippi channel. A listing of the above information is provided in Table I.

The climate of Kentucky is classified as continental temperate humid. Summers are warm and humid with an average temperature of 76°F, while winters are moderately cold with an average temperature of 34°F. Annual precipitation averages about 45 inches, but varies between 40 to 50 inches across the state. Maximum precipitation occurs during winter and spring and minimum precipitation occurs in late summer and fall.

Summary of Classified Uses

Kentucky lists waterbodies according to specific uses in its water quality standards regulations. These uses are Warmwater Aquatic Habitat, Coldwater Aquatic Habitat, Domestic Water Supply, Primary Contact Recreation, Secondary Contact Waters and Outstanding Resource Waters (ORW). Those waters not specifically listed are classified

Table I. Atlas

State population (1990 census)	3,685,296
State surface area (square miles)	40,598
Number of major river basins	13
Total number of river miles ^a	89,431
Number of river miles in EPA Reach File 3 ^b	49,105
Number of miles in assessment base	18,745
Number of miles assessed	9,219
Number of river border miles (subset)	855
Number of lakes/reservoirs	2,721
Number of lakes 10 acres or greater in size	953
Total acres of lakes/reservoirs	Unknown
Number of publicly owned lakes/reservoirs assessed	120
Lake acres assessed	218,362
Wetland acres	836,871
Total palustrine wetland acres	441,480

^a from 1:24,000 scale USGS maps; includes reservoir main channel and tributary channel miles

^b from 1:100,000 scale USGS maps

(by default) for use as Warmwater Aquatic Habitat, Primary and Secondary Contact Recreation, and Domestic Water Supply. The Domestic Water Supply use is applicable at points of public and semipublic water supply withdrawals. In addition, high quality waters and Outstanding National Resource Waters (ONRW) were established for antidegradation purposes in the most recent triennial review of water quality standards Recreation, and Outstanding Resource regulations. While not designated uses, High Quality status affords 45 waters additional protection, and ONRW status prohibits any degradation from occurring in three rivers. The DOW adds waterbodies to the regulation list as an ongoing process in its revision of water quality standards. Intensive survey data and data from other

studies, when applicable, are used to determine appropriate uses. Currently, 4,256 stream miles are listed as warmwater aquatic habitat, 410 miles as coldwater aquatic habitat, 732 miles as ORW, 30 miles as ONRW, and 5,081 miles as primary and secondary contact recreation. Also, underground river systems within Mammoth Cave National Park have ONRW status, and underground river systems adjacent to the park are classified as ORWs. By default, more than 84,000 miles are classified for the uses of Warmwater Aquatic Habitat, Primary and Secondary Contact Recreation, and Domestic Water Supply (if applicable). There are approximately 100 domestic water supply intakes in streams and another 80 intakes in 54 lakes. Twenty-nine lakes have been classified for specific uses in the water quality standards regulations.